

# Projected Climate Change, Potential Impacts and Associated Risks

Section B continued: Impacts Guiding AMBITION and  
CHOICES in Mitigation and Adaptation



## Impacts of global warming: Where do we want to go?

At 1.5°C compared to 2°C:

- Less impacts from extreme weather where people live
- By 2100, global mean sea level rise will be around 10 cm lower .... but will continue to rise for centuries
- 10 million fewer people exposed to risk of rising seas (...less coastal ecosystems exposed)

Jason Florio / Aurora Photos

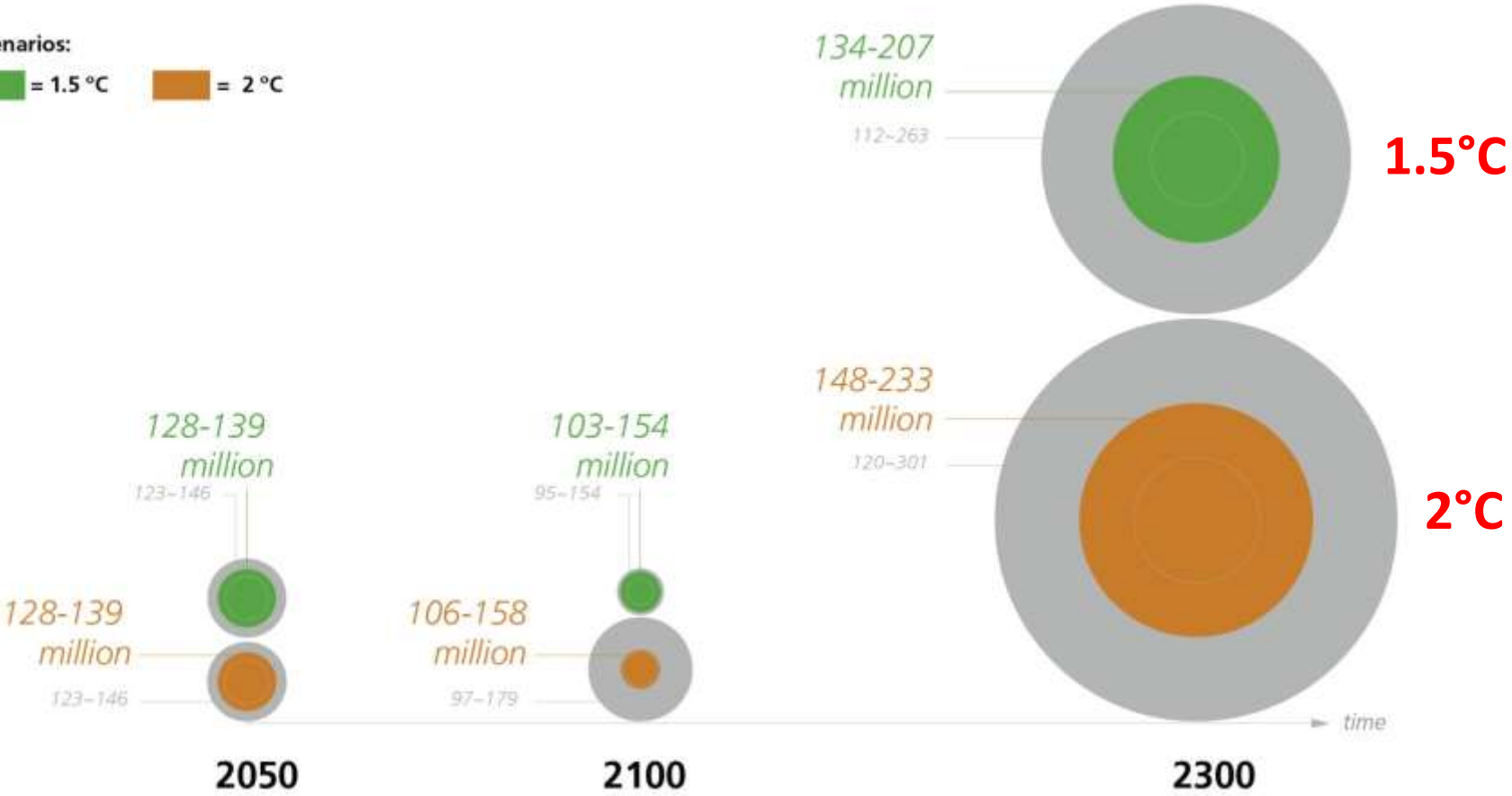
ipcc

INTERGOVERNMENTAL PANEL ON climate change



# People exposed to Sea Level Rise, assuming there is no adaptation or protection

Scenarios:  
■ = 1.5 °C    ■ = 2 °C



*Upper values correspond to the 50<sup>th</sup> percentile; values below correspond to the 5<sup>th</sup> to 95<sup>th</sup> percentile range*



# Where do we want to go?

At 1.5°C compared to 2°C:

- Lower impact on biodiversity and species
- Smaller reductions in yields of maize, rice, wheat crop yields
- Global population exposed to water shortages is up to 50% less (also less water shortages for ecosystems)



Andre Seale / Aurora Photos

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## SPM 1.5°C: Terrestrial biodiversity

- Of 105,000 species studied, 6% of **insects**, 8% of **plants** and 4% of **vertebrates** are projected to **lose over half of their climatically determined geographic range** for global warming of 1.5°C, **half of the respective numbers at 2°C**.
- Approximately 4% (interquartile range 2–7%) of the global **land area is projected to undergo a transformation of ecosystems from one type to another** at 1°C of global warming, compared with 13% (interquartile range 8–20%) at 2°C. This indicates that the area at risk is projected to be approximately **50% lower at 1.5°C compared to 2°C**.



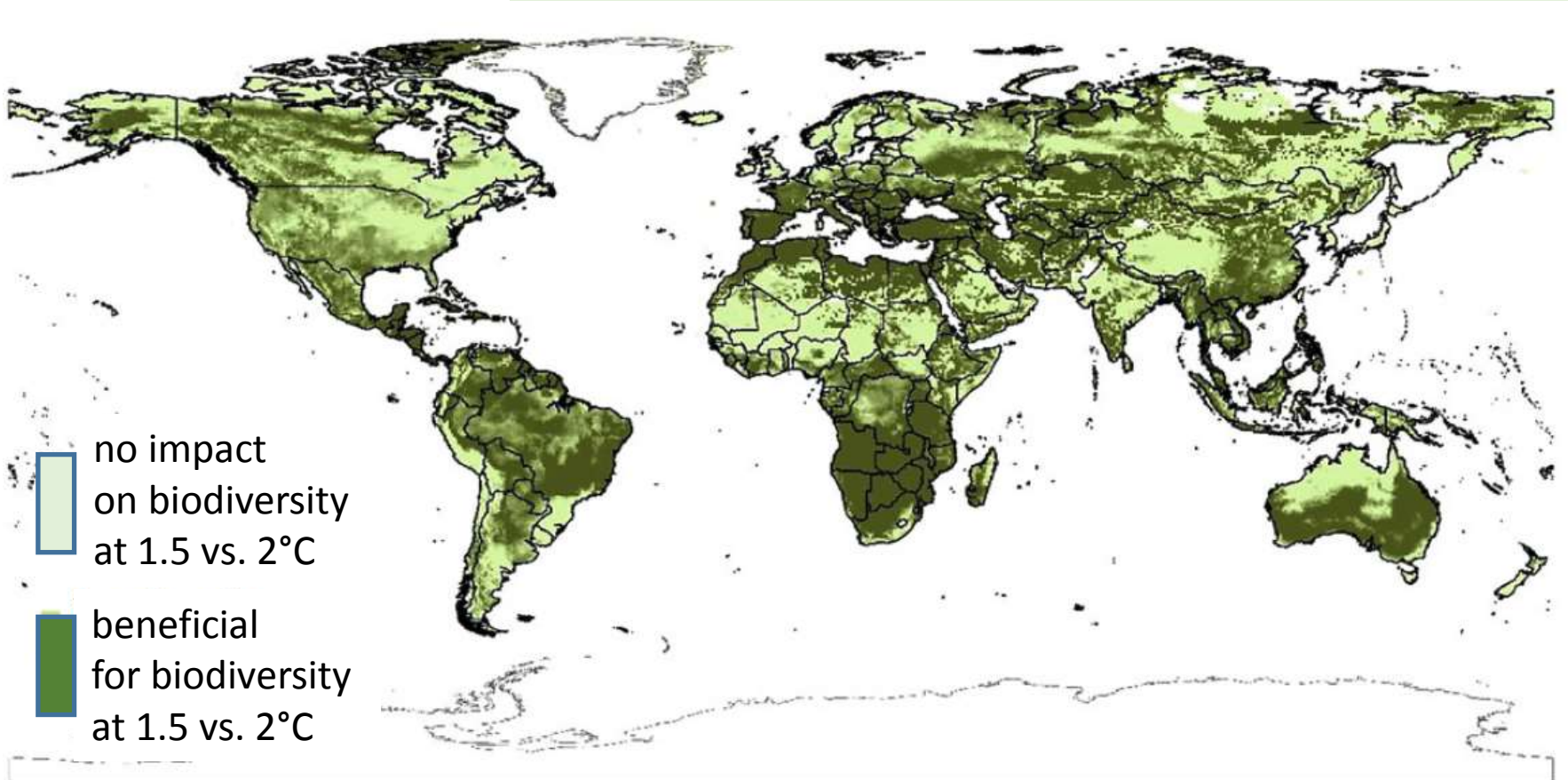
# Terrestrial biodiversity

P. Smith et al. 2018

## Where do we want to go?

At 1.5°C compared to 2°C:

- Lower impacts on biodiversity and species



Terrestrial Meta-analysis as in SR1.5

ILLUSTRATIVE EXAMPLE



# Where do we want to go?

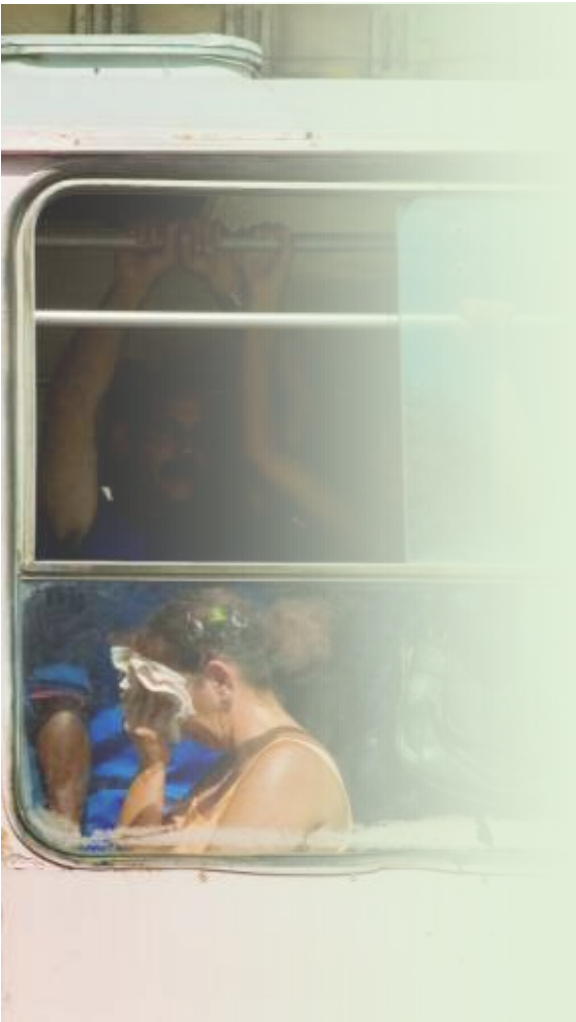
At 1.5°C compared to 2°C:

- Up to several hundred million fewer people exposed to climate-related risk and susceptible to poverty by 2050
- Lower risk to fisheries & the livelihoods that depend on them

# Where do we want to go?

At 1.5°C compared to 2°C:

- Disproportionately high risk for Arctic, dryland regions, small island developing states and least developed countries
- Lower risks for health, livelihoods, food security, water supply, human security and economic growth
- A wide range of adaptation options can reduce climate risks; less adaptation needs at 1.5°C



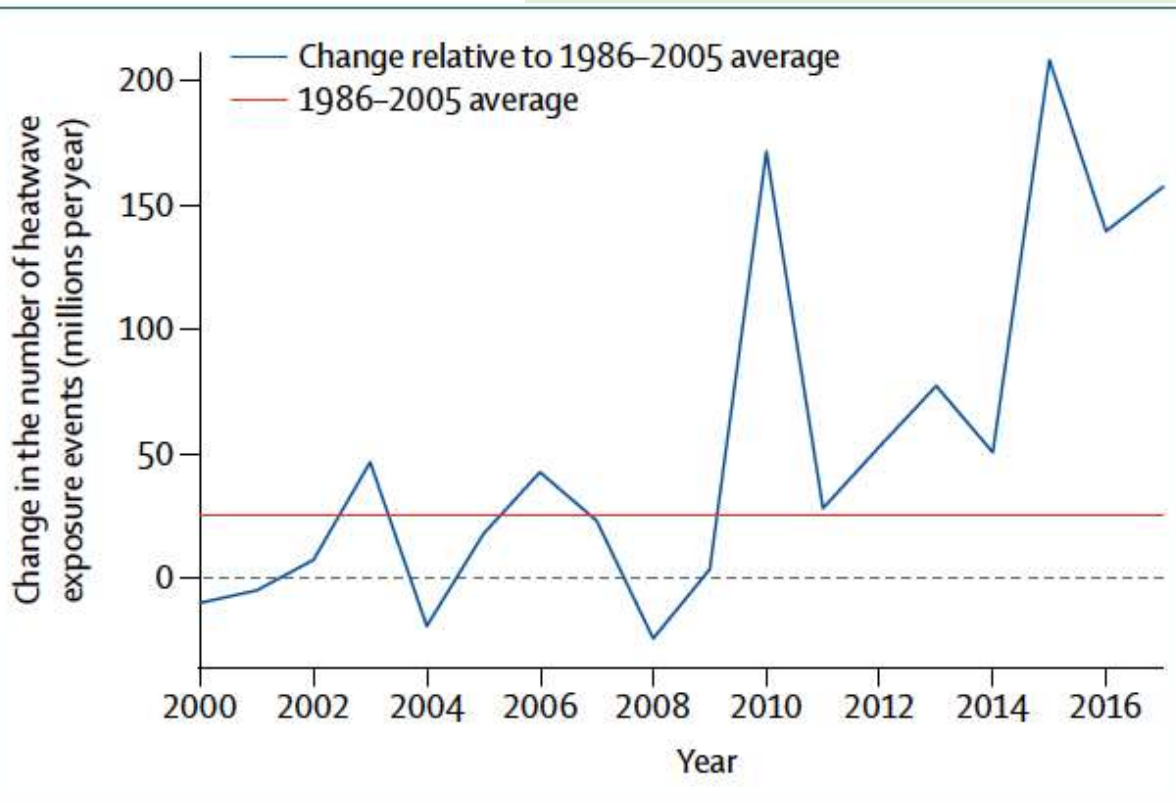
Jason Florio / Aurora Photos



## Where do we want to go?

At 1.5°C compared to 2°C:

- Reduced risk to human health – lower heat-related morbidity and mortality

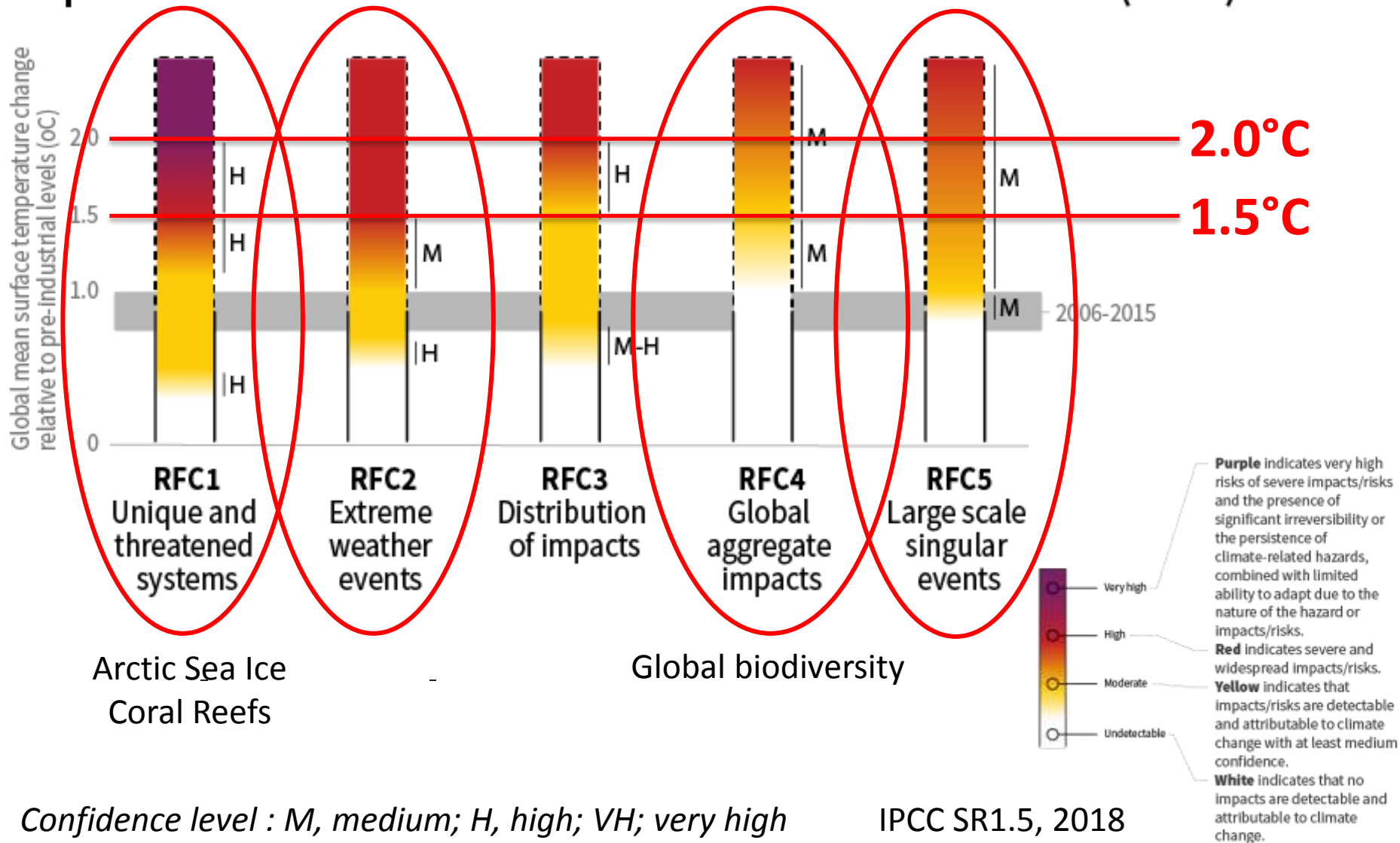


... on a rise linked to strengthened increase in heat wave exposures...

(Lancet 2018)

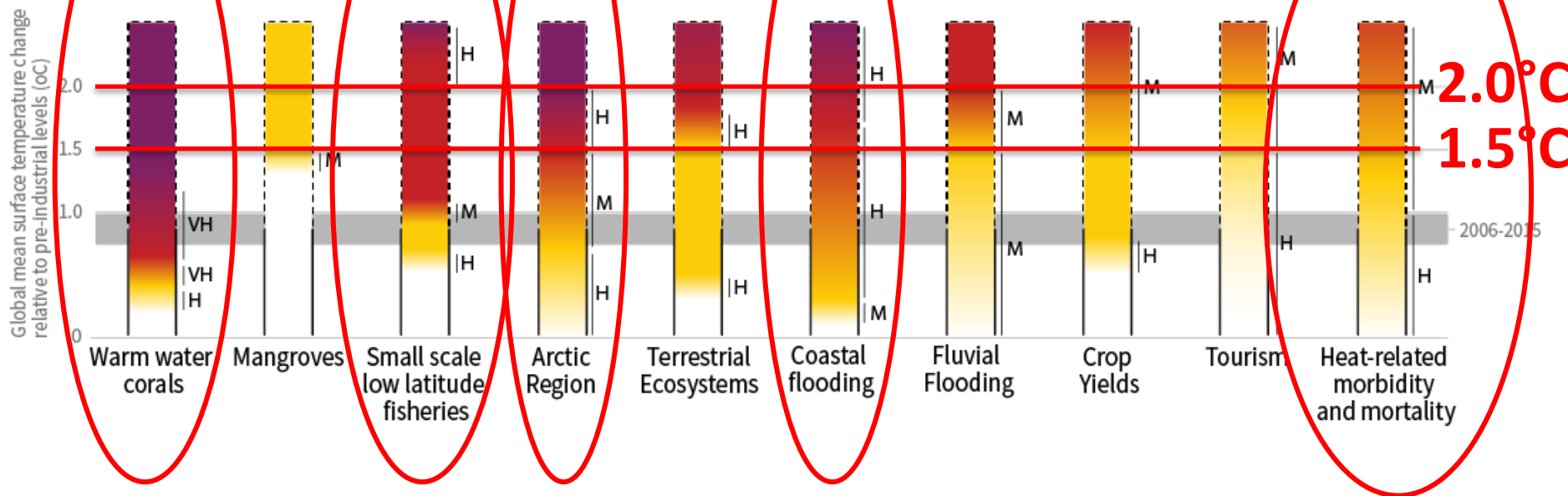
ILLUSTRATIVE EXAMPLE, TO BE ASSESSED IN AR6

# Impacts and risks associated with the Reasons for Concern (RFCs)



*....half a degree matters... every bit of warming matters....  
... for ecosystems, biodiversity and humankind*

### Impacts and risks for selected natural, managed and human systems



**...less loss and damage at 1.5°C**

Confidence level : M, medium; H, high; VH; very high

IPCC SR1.5, 2018



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OBSERVATIONS

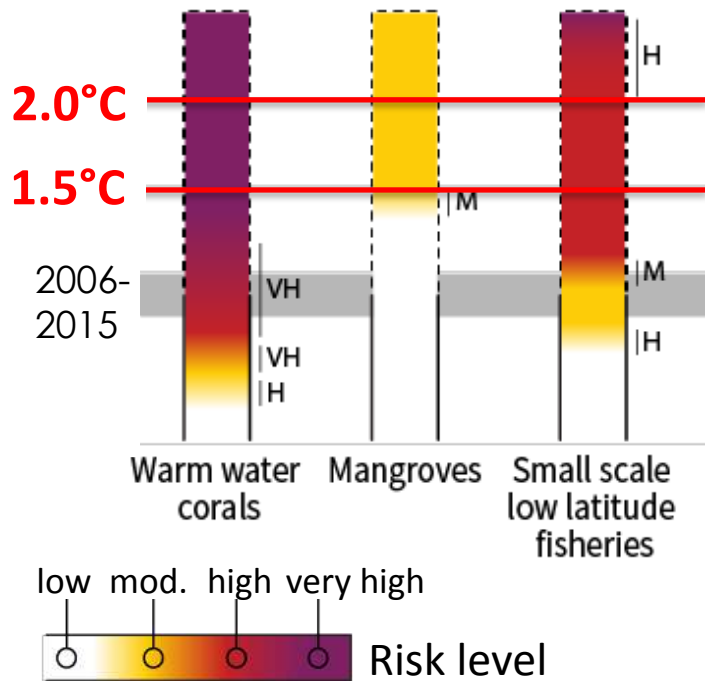
0.8 to 1.0°C



# Vulnerable ecosystem identified in AR5 and SR1.5

## Warm water coral reefs under various pressures

Assessing risk of global warming



Even in a 1.5°C warmer world... high risk of losing 70 to 90% of coral reefs and their services to humankind; ... even higher losses at 2°C

2016



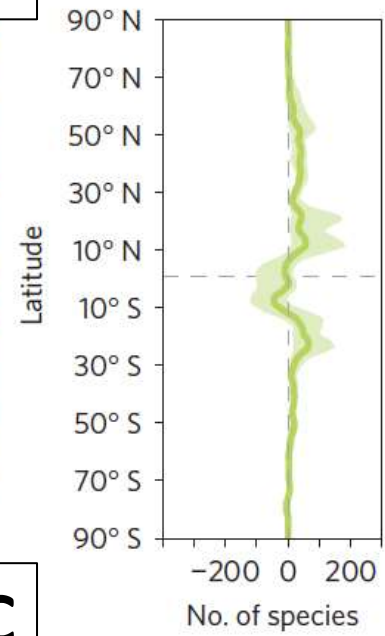
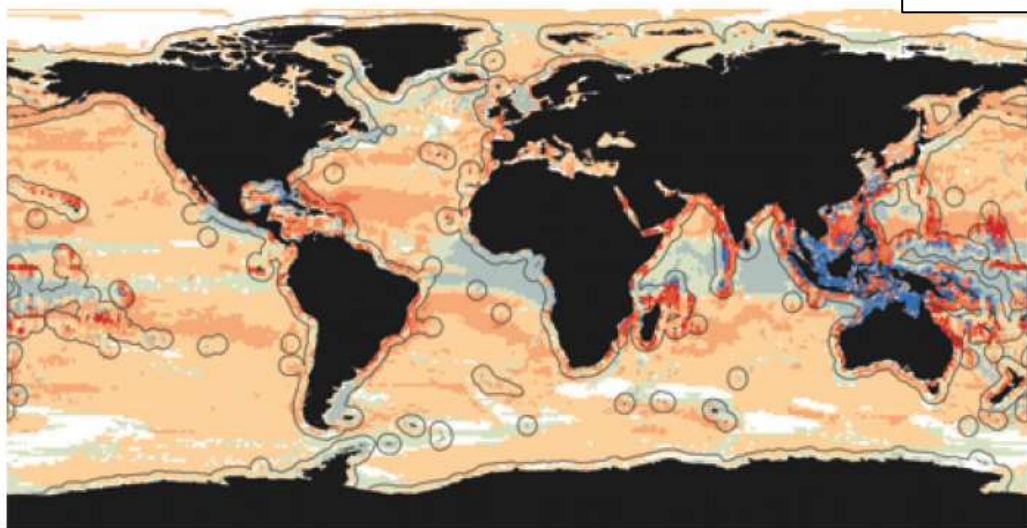
Drivers of change: **Warming and velocity....**

**+2°C**

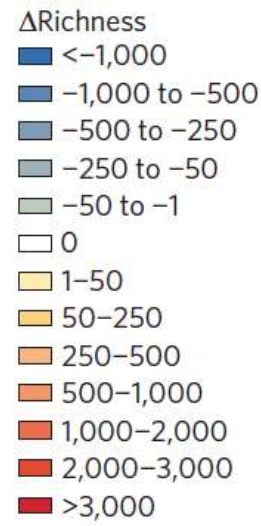
**AR5: Marine biodiversity**

**b**

ΔN° RCP4.5 (2006-2100)



RCP 4.5  
Garcia-Molinos  
et al. 2015,  
2017 NCC



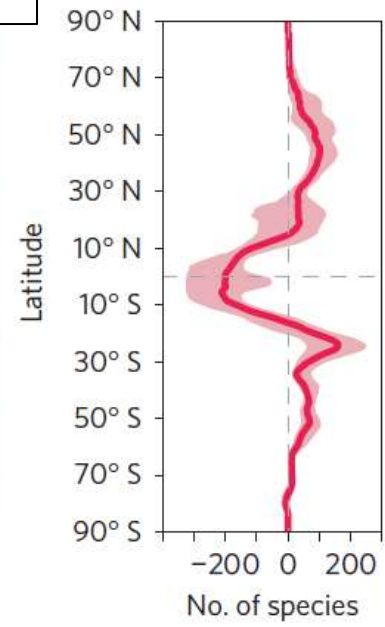
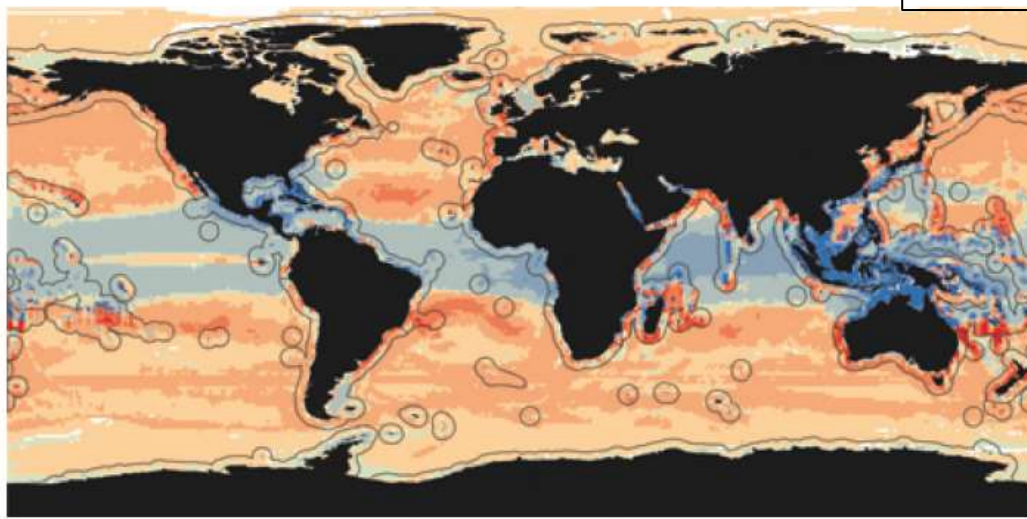
**RCP4.5 versus 8.5**

**Ultimate Species Heat Limits surpassed in Tropics**

**+4°C**

**c**

ΔN° RCP8.5 (2006-2100)



RCP 8.5

**Large changes in community composition expected  
driven by local invasions and losses**

**ILLUSTRATIVE EXAMPLE**



# Vulnerable ecosystems identified in AR5 and SR1.5:

## Arctic summer sea ice systems

1.5°C

≥2°C

RCP 2.6  
ambitious mitigation

RCP 8.5  
business as usual

Northern Hemisphere September sea ice extent (average 2081–2100)

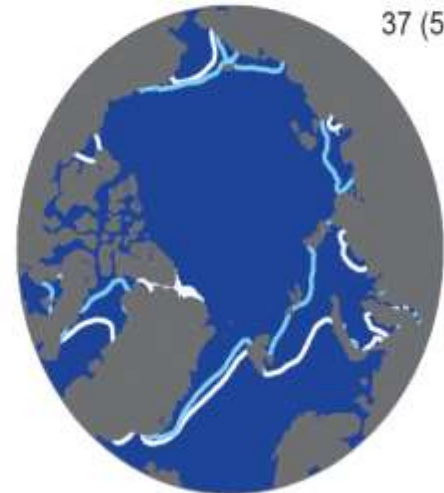
**1 in 100 years  
ice-free  
at 1.5°C**



- CMIP5 multi-model average 1986–2005
- CMIP5 multi-model average 2081–2100
- CMIP5 subset average 1986–2005
- CMIP5 subset average 2081–2100

37 (5)

**> 1 in 10  
years ice-  
free at  
2°C**





# Ambitious emissions reductions have...

- Co-benefits for
  - Human **health**
  - **Reduced competition** for land (BECCS)
  - **Food security** for humankind
  - **Ecosystem restoration** and carbon storage (soils and biomass)
  - **Biodiversity** conservation

***For minimizing impacts and associated risks....***

***Half a degree....,***

***...every bit of warming  
matters***

***Each year matters***

***Each choice matters***



Ashley Cooper/ Aurora Photos